Evaluation of Trial Bunker Hill Mine Water Diversion

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On December 19, 2002 Jim Stefanoff and Bill Hudson observed a trial mine water diversion in the Bunker Hill Mine. The purpose of the trial was to test a proposed diversion approach using a temporary dam across the Kellogg Tunnel to back water into the Barney Vent Raise and down to 10 Level. The trial was conducted by employees of The New Bunker Hill Mining Company (NBHMC).

Observations

The attached photos show the trial diversion dam. The dam was constructed from sand bags, boards, and tarps across the Kellogg Tunnel just downstream (north) of the Barney Switch. Dam construction materials are stored adjacent to the dam site. The total mine water flow dammed and diverted to 10 Level was about 1550 gpm. About 50 gpm was leaking through the dam, although this could be readily reduced by another layer of sandbags on the downstream face. The depth of water behind the dam during was about 2 feet on the sides, and about 3 inches above the rail in the middle. The dam would have to be increased in height for higher flows. The reported construction time for the trail dam was 30 minutes.

The diverted water flows to 10 Level via the Barney Vent Raise. The New Bunker Hill Mining Company cleaned out the raise over the last three or four weeks through a combination of digging accumulated muck from the bottom and by sluicing water from above. The last sluicing event resulted in a large volume of debris and muck to suddenly flow from the bottom of the raise into the drift on 10 Level. The depth of the debris increases towards the bottom of the raise, and varies from about 1 foot 200 to 250 feet away to within about one to two feet of the drift ceiling near the bottom of the raise. Removal of this debris would be very difficult due to its large volume and lack of rail access. The approach to this area requires a climb down a series of ladders in the Orr Raise, and then wading through water up to three feet deep. There appears to be adequate open space at the bottom of the raise for water flow up to the 7,000 gpm required capacity.

Recommendations

Based on the trial the proposed diversion approach is acceptable. The proposed approach is simple and provides flexibility to quickly accommodate a range of flows. The following are recommendations for operation and maintenance of the diversion system:

- The amount of stockpiled diversion building materials should be increased by about 50 percent. This is to ensure an adequate supply for high flows.

- The diversion dam location needs to be kept clean so that the tunnel cross-section is constant. This will reduce dam construction time.
- The Barney Vent Raise should be inspected from the top and bottom a minimum of twice per year, and more frequent if there is doubt concerning its ability to convey up to 7,000 gpm.
- The Barney Vent Raise should be hydraulically flushed at least once per year, and more frequent if needed to provide 7,000 gpm capacity. The flushing volume should be as high as practical. The duration should be as needed for cleanout.
- The mine crew should periodically practice diversion dam construction. Written procedures should be developed by NBHMC and posted at the diversion location. This may be a good time for hydraulically flushing the Barney Vent Raise.

Photo 1

Looking downstream at back of trial diversion dam on 9 Level. The dam is constructed across the Kellogg Tunnel just past (north) of the Barney Switch. The dam is made from sandbags, boards, and plastic tarps. Additional sandbags, boards, and tarps are stored to the right of the photo. The depth of water behind the dam is about 2 feet on the sides, and about 3 inches above the rail in the middle. The flow being dammed is about 1550 gpm. About 50 gpm was leaking through the dam, although this could be readily reduced by another layer of sandbags on the downstream face. The dam would have to be increased in height for higher flows. The reported construction time was 30 minutes.

Photo 2

Looking upstream at the trial diversion dam.

Photo 3

Stockpiled dam building materials located to the side of the dam site. Materials consist of sand bags, boards, and plastic tarps.

Photo 4

Dammed water backing up the Barney Drift (right side of photo) and draining down the Barney Vent Raise (left side of photo). The top of the raise is located below the old ore car. The trial diversion dam is about 100 feet behind these photos.

Photo 5

Dammed water draining down the Barney Vent Raise. The top of the raise is located below the old ore car.

Photo 6

Looking upstream towards the bottom of the Barney Vent Raise on 10 Level. The bottom of the raise is about 200 feet up this drift. The debris and muck in the bottom of the drift accumulated when water, drained into the raise to clean it out, must have built up--then suddenly blew out carrying the debris with it. The diverted water is flowing across the top of the debris and muck. The depth of the debris increases towards the raise. At the back of this drift near the bottom of the raise the debris is up to within one to two feet of the ceiling. Removal of this debris would be very difficult. There currently appears to be adequate open space for water flow.